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Original Research

The extent of awareness and knowledge of people in the northern border region of saudi arabia about the effect of diabetes mellitus on the retina

Awareness and knowledge about the effect of diabetes mellitus on the retina

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Abstract
Aim: Diabetic ocular complications, especially diabetic retinopathy (DR), are a major cause that leads to irreversible blindness. Awareness of diabetes and its ocular complications may help in preventing vision loss.
This study evaluates the awareness of people (diabetics and non-diabetics) about the complications of diabetes in the eye, especially the retina.
Material and Methods: This study is a questionnaire-based cross-sectional study. Data was collected through an online self-administered questionnaire. The target people from 16 years to 75years in both males and females
The duration of the study from May 2024 to September 2024
The comparisons between the awareness about diabetic retinopathy and the association of awareness about diabetic retinopathy and educational level were analyzed using SPSS 24.0 version software.
Results: The study included 153 individuals. The age range of participants was 16–75, and the most dominant age group was those with an age range of 46–55 (35.7%).
The ratio of male to female was 58.8:41.2, regarding education, the most dominant group was those who had a university education, 80 (52,3%), then higher education level 46 (30.1). Most of the participants, 127 (83%) non-diabetic and 26 (17%) diagnosed with Diabetes mellitus. Of most of the participants, 141(80 males and 61 females), 92.2% of participants reported that diabetes affects the retina, and 87(45 males and 42 females) 56.9% agreed with the relation between diabetic retinopathy and blindness. 121(67 males and 54 females) 79.1% of participants reported that the control of blood glucose level can prevent diabetic retinopathy
There was high awareness among the participants, diabetic and non-diabetic, regarding diabetic retinopathy (DR), but annual check-ups were done in less than half of the patients. Improvement is required for scheduling annual eye examinations for the early detection of diabetic retinopathy (DR).
Discussion: The results of this study showed a high level of self-report awareness regarding the association between DM and retinopathy. These results are in harmony with other local and international studies. All these studies found that the awareness regarding the association between DM and retinopathy is high among the people of higher education. This is due to the spread of social media, which has led to increased awareness among many people.
By comparing the present study with the other studies in different regions of Saudi Arabia, we found that the awareness of participants by diabetic retinopathy was 91.5% in the Northern Border region. KSA and 42% of them got their information from the doctors. Whereas in Hail, Taif, Jeddah, and a study from King Abdul Aziz University Hospital, there were 75.62%, 64%, 82.6%, and 61%, respectively, who had awareness. In a recent study in Madinah, Saudi Arabia, among 240 patients, less than half of the patients had a fair level of knowledge (47.1%) and a good level of knowledge (42.1%) about diabetic retinopathy.
Also, the results of the studies all over the world showed the level of awareness regarding diabetic retinopathy high in India 50%, USA52%, and Oman 75%. The awareness was higher in Myanmar 86% and Nigeria 84.3%
The strength of this study included patients of all ages from 16 to 75, and Most of the participants have a university education or higher.

Keywords
Awareness, Diabetes Mellitus, Diabetic Retinopathy, Eye Examination, Northern Border Region Ksa

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Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by high glucose levels and the body's inability to produce or use insulin, which leads to multiple microvasculopathic abnormalities of the eye, leading to diabetic retinopathy (DR) [1].

Diabetic retinopathy (DR) is one of the major causes of visual disability, leading to irreversible blindness among adults. The pathogenesis of the disease emerges as neuroretinopathy and vascular changes in the retinal blood vessels because of a breakdown of the blood-retinal barrier and obliteration of the retinal capillaries [2]. Many systematic reviews of 59 population-based studies estimated the worldwide prevalence of diabetic retinopathy (DR) to be 35% [3].

Diabetic retinopathy (DR) is one of the common complications of Diabetes mellitus (DM). The duration of DM is a significant factor in developing DR. The longer the duration of DM, the higher the risk for DR. It affects about 1/5th of diabetic patients with a duration of disease from 10 to 15 years [4] According to studies from different areas in Saudi Arabia, the prevalence of diabetic retinopathy was found to be 28%-36% among diabetic patients [5, 6].

Studies in The Kingdom of Saudi Arabia (KSA) indicate a significant increase in the prevalence and incidence rates of type 1 diabetes mellitus, mainly among children and adolescents [7].

According to many studies estimated that diabetes mellitus is a common disease in Saudi Arabia about 23%-32% of its adult population suffers from the disease. Understanding the level of public awareness of diabetes and its affection on the retina helps the decision maker to plan a future program that increases the level of knowledge in diagnosis, complications, and management among patients. The level of awareness and knowledge about diabetes is a crucial part of the early diagnosis, management, and prevention of potential visual impairment [8].

Material and Methods

This study is a questionnaire-based, cross-sectional study of diabetic and non-diabetic individuals. Data was collected through an online self-administered questionnaire. The target people were from 16 -75 years old, both sexes (male and female). The duration of the study is from May 2024 to September 2024.

The comparisons between the awareness about diabetic retinopathy and the association of awareness about diabetic retinopathy and educational level were analyzed using SPSS 24.0 version software.

Ethical Approval

This study was approved by the Local Committee of Bioethics (HAP-09-A-043) at Northern Border University (Date: 2024-05-19, No: 24/54/H).

Results

The present study included 153 individuals. The age range of participants was 16–75, and the most dominant age group was those with an age range of 46–55 (35.7%).

The ratio of males to females was 58.8:41.2, regarding education, the most dominant group was those who had a university education, 80 (52,3%), then higher education level above university education, 46 (30.1). Most of the participants 127 (83%) non-diabetic and 26 (17%) diagnosed with DM. Of most of the participants, 141(80 male and 61female), 92.2% of participant reported that diabetes affects the retina (Figure 1)

Table 1. the Questionnaire

Questionnaire	
Age in years	o 16-25
	o 26- 35
	o 36-45
	o 46-55
	o 56-65
	o 66 -75
Diabetic or non-diabetic	o Does not have diabetes
	Diabetics: o type 1 o Type 2
Education level	o No education
	o Primary school
	o Middle school
	o Secondary school
	o University
	o higher
Gender	o Male
	o female
Family history of diabetes	o Yes
	o No
Type of treatment for diabetes:	o Tablets
	o Injections
	o Both tablets and injections
Do you know that diabetes can affect the retina?	o Yes
	o No
	o To some extent
Does diabetes cause blindness?	o Yes
	o No
	o To some extent
Can diabetic retinopathy be treated?	o Yes
	o No
The time of the first retinal examination after diagnosis of diabetes	.....
Does good blood sugar control prevent diabetic retinopathy?	o Yes
	o No
	o To some extent
How often should you have an eye exam to check for diabetic retinopathy?	o 6 months
	o Annually
	o Only when visibility is low
	o Lack of awareness of repetition
Why not perform an eye/retinal examination?	o From a remote area
	o Lack of money
	o Lack of time
	o No visual problem
	o Lack of a caregiver
	o Other reasons
What is the source of your knowledge about diabetic retinopathy?	o Doctor
	o Friends
	o Relatives
	o Media
	o Not aware

Table 2. Diabetes participant's awareness about diabetic retinopathy (n=153)

n		Percentage
Do you know that diabetes can affect the retina?	141	92.2%
Does good blood sugar control prevent diabetic retinopathy?	121	79.1%
Does diabetes cause blindness?	87	56.9%
Main source of information about diabetes mellitus and diabetic retinopathy:		
Doctors	66	43.1%
Family and friends	25	16.4%
Social media	43	22.2%
I did not get any information	28	18.3%
How often should you have an eye exam to check for diabetic retinopathy?		
6 months	79	51.6%
Annual	36	23.5%
Only when vision is low	27	17.6%
Lack of awareness	11	7.2%

Table 3. Association between sex of the participants and awareness of diabetic retinopathy (DR) &Association between the educational level of the participants and awareness of diabetic retinopathy (DR) & The family history of the participant and awareness of diabetic retinopathy

	Yes	No	To some extent	The p-value at p < .05
Do you know that diabetes can affect the retina?				
Male	80	4	6	0.195
Female	61	1	1	
Does good blood sugar control prevent diabetic retinopathy?				
Male	67	1	22	0.195
Female	54	1	8	
Does diabetes cause blindness?				
Male	45	3	42	0.131
Female	42	3	18	
Do you know that diabetes can affect the retina?				
Secondary school	23	1	3	0.481
University education	74	3	2	
Higher education	45	2	2	
Does diabetes cause blindness?				
Secondary school	13	1	13	0.1539
University education	51	5	23	
Higher education	23	1	23	
Does good blood sugar control prevent diabetic retinopathy?				
Secondary school	20	1	6	0.243
University education	59	1	19	
Higher education	42	1	4	
Do you know that diabetes can affect the retina?				
Positive family history	78	1	2	0.207
No family history	64	3	5	
Does diabetes cause blindness?				
Positive family history	102	2	11	0.00001
No family history	13	2	23	
Does good blood sugar control prevent diabetic retinopathy?				
Positive family history	71	0	13	0.162
No family history	52	2	15	

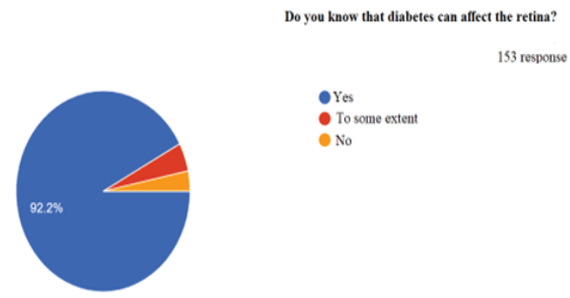

Figure 1. The responses to the question: Do you know that diabetes can affect the retina?

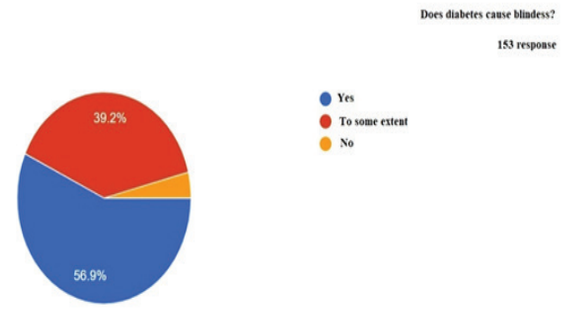

Figure 2. The responses to the question: Does diabetes causes blindness?

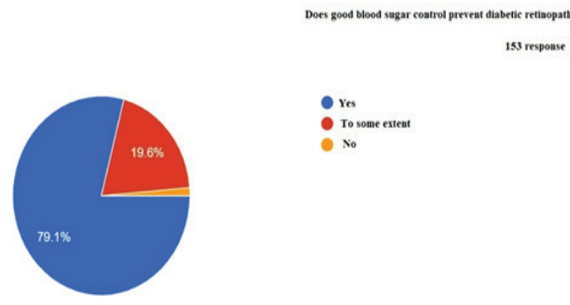

Figure 3. The responses to the question: Does good blood sugar control prevent diabetic retinopathy?

Regarding the relation between diabetic retinopathy and blindness, 87 (45male and 42 female) 56.9% were aware of the relation between diabetic retinopathy and blindness (Figure 2)

Of the participant, 121(67 male and 54 female), 79.1%of participants reported that the control of blood glucose levels can prevent diabetic retinopathy Fig.3.

The main source of information about diabetes mellitus and diabetic retinopathy was reported to be doctors (43.1%), followed by social media (22.2%).

The participants' responses to awareness are as follows There were 141 (92.2%) who were aware that diabetes mellitus could affect the retina, whereas 121 (79.1%) were aware that control of blood sugar reduces the risk of DR, and 79 (51,6) believed that the diabetic retinopathy can treatable disease and 87(56.9%) patients were aware that DR could lead to blindness. 79 (51.6%) reported that the examination of the eye in diabetic patients every 6 months, and the reason for not having an eye examination is a lack of knowledge about the disease in 66 (43.1%). The main source of information about diabetes mellitus and DR was reported to be by doctors (43.1%), followed

by social media (22.2%).

The awareness that (diabetes mellitus can cause diabetic retinopathy, that control of diabetes mellitus reduces the risk of diabetic retinopathy, and that diabetic retinopathy can lead to blindness) was compared with different demographic variables as male and female participants and with the different levels of education by using the Chi-square test.

No significant association between the sex and the awareness that diabetes mellitus can cause diabetic retinopathy, that control of diabetes mellitus reduces the risk of diabetic retinopathy, and that diabetic retinopathy can lead to blindness (P-value 0.195,0.195 and 0.131, respectively) also No significant difference There between the university educational level and the higher education.

By the comparison between the association between the family history and the awareness that DM can cause retinopathy, that control of DM reduces the risk of DR, and that DR can lead to blindness, there was no significant association between the family history and the awareness that the DM can cause the retinopathy (p-value 0.207) and that that control of DM reduces the risk of diabetic retinopathy (P-value 0.162) while there was a significant association between the family history and the awareness that diabetes can cause the blindness (p-value is < 0.00001).

By the comparison between the association between the family history and the awareness that DM can cause retinopathy, that control of DM reduces the risk of DR, and that DR can lead to blindness, there was no significant association between the family history and the awareness that the DM can cause the retinopathy (p-value 0.207) and that that control of DM reduces the risk of diabetic retinopathy (P-value 0.162) while there was a significant association between the family history and the awareness that diabetes can cause the blindness (p-value is < 0.00001).

Discussion

The study aimed to assess the level of non-diabetic and diabetic patients' awareness in the Northern Border Governorate, KSA. Diabetes mellitus is a common cause of Diabetic retinopathy, which is one of the causes of visual impairment and blindness, and the awareness of the population of the complications of diabetes plays an important role in the prevention of diabetic retinopathy [2].

This study found that the awareness among the diabetic and non-diabetic participants is high regarding Diabetic Retinopathy, with (91.7%) being aware that DM can affect the retina. 57% are aware that DR can lead to blindness. 88.3 of the patients were also aware that control of blood sugar may reduce the risk for DR.

The results of this study showed a high level of self-reported awareness regarding the association between DM and retinopathy, this result is in harmony with other international and local studies [9, 10, 11, 12, 13] all these studies found that the awareness regarding the association between DM and retinopathy is high between the peoples of higher education whereas one study showed the lowest awareness from the rural area in India [14]. This is due to the spread of social media, which has led to increased awareness among many people. Some studies concluded that WhatsApp was the social media most used in Saudi Arabia by the participants to communicate and obtain information about diabetes, and social media was useful in improving education, awareness, and communication among people with diabetes [15].

By comparing the present study with the other studies in different regions of Saudi Arabia, we found that in this study, the awareness of participants by diabetic retinopathy was 91.5% among the participants in the Northern Border region. KSA and 42% of them got their information from the doctors. Whereas Studies from different areas in Saudi Arabia reported different levels of knowledge about diabetic retinopathy in Hail, Taif, and Jeddah, and studies from King Abdul Aziz University Hospital, Jeddah, there were 75.62%, 64%, 82.6%, and 61%, respectively, who had awareness [10, 11, 16, 17]. In a recent study in Madinah, Saudi Arabia, among 240 patients who participated, less than half of the patients had a fair level of knowledge (47.1%) and a good level of knowledge (42.1%) about diabetic retinopathy [18].

The results of the studies all over the world showed the level of awareness of diabetic retinopathy high in India 50%, USA52%, and Oman 75% [19, 20, 12]. The awareness was higher in Myanmar, 86%, and Nigeria, 84.3% [21, 22].

The variation in the level of awareness between different studies and this study was due to the variation in the level of education of each population in our study. All participants had a high level of education, and the percentage of education among the participants was high: 17% secondary, 30% university education, 53% higher than university education. Higher awareness was significantly associated with a higher level of education [12]. In a Saudi study, such a correlation between awareness and education was reported, in this study, a significant association between educational level (in this study, 43.5% of participants have higher education level) and awareness about DM and retinopathy. This was similar to the studies from Jordan [9] and Malaysia, both of which showed that higher educational people had better awareness than those with low educational levels.

In this study, there were 79% of participants awarded the control of blood sugar-preventing retinopathy. In a similar study, (70.8%) of patients reported good levels of blood glucose control the DR. [24] Other studies concluded poor diabetic control among diabetes mellitus type 2 patients, which resulted in a high rate of complications [25].

The main source of information about DM and DR (59.4%) from their doctors, followed by social media (20.3%) and their family (11.3) and friends (9.7); this is similar to the findings from the two studies from Jordan and Malaysia [9, 23].

In our study, (54%) of patients reported a family history of diabetes; this percentage was less than that in other studies conducted in Madinah (92%). [19] And studies in Riyadh, Saudi Arabia, in which 70% and 79.8% of patients had a family history of diabetes [25].

The strength of this study included patients of all ages from 16 to 75, and Most of the participants have a university education or higher.

Limitation

The present study has some limitations. Because the study was

shown only in one Saudi Arabian region, the generalization of the results is limited. Additionally, the non-probability sampling method may be subjected to selection bias. The information regarding diabetic retinopathy awareness was gathered via self-reported responses to questionnaire items rather than from medical records, so the participant may have over-reported.

Conclusion

The study found a high level of awareness of diabetic retinopathy among the participants, and there was an association between the level of education and awareness. Also, medical doctors are the main source of information.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or compareable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

References

1. Smith L, Burnet S, McNeil J. Musculoskeletal manifestations of diabetes mellitus. Br J Sports Med. 2003;37:30-65

2. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2011;34(Suppl 1):62-9.

3. Teo ZL, Tham YC, Yu M, Chee ML, Rim TH, Cheung N, et al. The global prevalence of diabetic retinopathy and projection of Burden through 2045: Systematic review and meta-analysis. Ophthalmology. 2021;128(11):1580-1591

4. Voigt M, Schmidt S, Lehmann T, Kohler B, Kloos C, Voigt U, et al. Prevalence and progression rate of diabetic retinopathy in type 2 diabetes patients in correlation with the duration of diabetes. Exp Clin Endocrinol Diabetes. 2018;126:570–6.

5. Hajar S, Hazmi AA, Wasli M, Mousa A, Rabiu M. Prevalence and causes of blindness and diabetic retinopathy in Southern Saudi Arabia. Saudi Med J. 2015;36:449–55.

6. Ahmed RA, Khalil SN, Al-Qahtani MAA. Diabetic retinopathy and the associated risk factors in diabetes type 2 patients in Abha, Saudi Arabia. J Family Community Med. 2016;23:18–24.

7. Habeb AM, Al-Magamsi MS, Halabi S, Eid IM, Shalaby S, Bakoush O. High incidence of childhood type 1 diabetes in Al-Madinah, North West Saudi Arabia (2004-2009). Pediatr Diabetes. 2011;12(8):676-81.

8. Alqurashi KA, Aljabri KS, Bokhari SA. Prevalence of diabetes mellitus in a Saudi community. Ann Saudi Med. 2011;31:19–23.

9. Bakkar MM, Haddad MF, Gammoh YS. Awareness of diabetic retinopathy among patients with type 2 diabetes mellitus in Jordan. Diabetes. Metab Syndr Obes. 2017;10:435–41.

10. Al Zarea BK. Knowledge, attitude, and practice of diabetic retinopathy amongst the diabetic patients of AlJouf and Hail Province of Saudi Arabia. J Clin Diagn Res. 2016;10:NC05–8.

11. Alzahrani SH, Bakarman MA, Alqahtani SM, Alqahtani MS, Butt NS, Salawati EM, et al. Awareness of diabetic retinopathy among people with diabetes in Jeddah, Saudi Arabia. Ther Adv Endocrinol Metab. 2018;9:103–12.

12. Khandekar R, Harby SA, Harthy HA, Lawatti JA. Knowledge, attitude, and practice regarding eye complications and care among Omani persons with diabetes - A cross sectional study. Oman J Ophthal. 2010;3:60–5.

13. Cetin EN, Zencir M, Fenkci S, Akin F, Yildirim C. Assessment of awareness of diabetic retinopathy and utilization of eye care services among Turkish diabetic patients. Prim Care Diabetes. 2013;7:297–302.

14. Balasubramaniyan N, Ganesh Kumar S, Ramesh Babu K, Subitha L. Awareness and practices on eye effects among people with diabetes in rural Tamil Nadu, India. Afr Health Sci. 2016;16:210–7.

15. Alzahrani A, Alanzi T. Social Media Use By People With Diabetes In Saudi Arabia: A Survey About Purposes, Benefits And Risks. Diabetes Metab Syndr Obes. 2019;12:2363–2372.

16. Almalki NR, Almalki TM, Alswat K. Diabetics retinopathy knowledge and awareness assessment among the type 2 diabetics. Open Access Maced J Med Sci. 2018;6:574.

17. Alasiri RA, Bafaraj AG. Awareness of diabetic retinopathy among diabetic patients in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. Annl Int Med Dental Res. 2016;2:42–5.

18. Albadrani MS, Alrehaili AM, Alahmadi SH, Aljazaeri AA, Almaghthawi OF, Alanazi SN, et al. Awareness of Diabetic Retinopathy Among Patients With Type 2 Diabetes Mellitus in Primary Healthcare Centers in Madinah, Saudi Arabia: A Cross-Sectional Study. Cureus. 2023;15(11):e49718.

19. Namperumalsamy P, Kim R, Kaliaperumal K, Sekar A, Karthika A, Nirmalan PK. A pilot study on awareness of diabetic retinopathy among non-medical persons in South India. The challenge for eye care programmes in the region. Indian J Ophthalmol. 2004;52:247–51.

20. Muñoz B, O'Leary M, Fonseca-Becker F, Rosario E, Burguess I, Aguilar M, et al. Knowledge of diabetic eye disease and vision care guidelines among Hispanic individuals in Baltimore with and without diabetes. Arch Ophthalmol. 2008;126:968–74.

21. Muecke JS, Newland HS, Ryan P, Ramsay E, Aung M, Myint S, et al. Awareness of diabetic eye disease among general practitioners and diabetic patients in Yangon, Myanmar. Clin Exp Ophthalmol. 2008;36:265–73.

22. Mohammed I, Waziri AM. Awareness of diabetic retinopathy amongst diabetic patients at the murtala mohammed hospital, Kano, Nigeria. Niger Med J. 2009;50:38–41.

23. Tajunisah I, Wong P, Tan L, Rokiah P, Reddy S. Awareness of eye complications and prevalence of retinopathy in the first visit to eye clinic among type 2 diabetic patients. Int J Ophthal. 2011;4:519–24

24. Amir AH, Jadoon MZ, Zeb S, Sabir S. Awareness diabetic retinopathy amongst known diabetics. J Postgrad Med Inst 2007;21:10–15

25. AlHargan MH, AlBaker KM, AlFadhel AA, AlGhamdi MA, AlMuammar SM, AlDawood HA. Awareness, knowledge, and practices related to diabetic retinopathy among diabetic patients in primary healthcare centers at Riyadh. Saudi Arabia. J Family Med Prim Care. 2019;8:373-377.

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